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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/067,910
Filing Date: February 08, 2002
Appellant(s): BOERTJES ET AL.

James McGraw
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 13 October 2006 appealing from the Office action mailed 13 April 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incomplete. A correct statement of the status of the claims is as follows:

This appeal involves claims 1-3, 15 and 39-44.

Claims 1-3, 15 and 39-44 have been rejected.

Claims 4-14 and 16-38 have been canceled.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect.

The amendment after final rejection filed on 29 August 2006 has not been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: the follow issue is added.

Whether claim 44 is deficient under the requirement of the second paragraph of 35 U.S.C. 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(7) Claims Appendix

Claim 44 contain(s) substantial errors as presented in the Appendix to the brief. Accordingly, claim 44 correctly written in the Appendix to the Examiner's Answer.

(8) Evidence Relied Upon

K. Ho et al., "Method for Crosstalk Measurement and Reduction in Dense WDM Systems", Journal of Lightwave Technology, Vol. 14, No. 6, June 1996

S. Seydnejad et al., "Estimation of the SRS Crosstalk on Pilot-Tones in WDM Systems Using a Dither Transfer Matrix, OFC 2001, 17-22 March 2001.

5,892,606 FATEHI et al. 4-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim 44 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 44 recites the limitation "basic functional components" in lines 1-2 of the claim. The meaning of "basic functional components" is unclear. In other words, given an optical device, the specification does not teach how to determine whether the optical device is a basic functional component or not.

Claims 1-3, 15, 39-40, 42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al. (K. Ho et al., "Method for Crosstalk Measurement and Reduction in Dense WDM Systems", Journal of Lightwave Technology, Vol. 14, No. 6, June 1996) in view of Seydnejad et al. (S. Seydnejad et al., "Estimation of the SRS Crosstalk on Pilot-Tones in WDM Systems Using a Dither Transfer Matrix", OFC 2001, 17-22 March 2001).

Regarding claims 1-2 and 15, Ho et al. discloses in FIG. 1 a crosstalk monitoring scheme. FIG. 1 teaches multiplexed optical signal comprising wavelength channels λ_1, ...λ_i,... λ_N, wherein each channel is impressed with a dither frequency f_i. FIG. 1 teaches tone power monitor where tones f_i, f_{i-1}, f_{i+1}, ..., etc. are measured. Ho et al. teaches in Equation (5) crosstalk level $XT_{k,i}$ which is equivalent to β_{ij} of instant claim. The difference between Ho et al. and the claimed invention is that Ho et al. does not teach to use the method and apparatus for measuring crosstalk caused by non-linear process of transmission medium. However, the method and apparatus of Ho et al. is capable of measuring crosstalk of any kind regardless of the cause of the crosstalk. To strengthen the rejection, the Examiner cites Seydnejad et al. for teaching that SRS causes crosstalk. Seydnejad et al. also suggests to use dithers for measuring crosstalk caused by SRS. One of ordinary skill in the art would have been motivated to combine the teaching of Seydnejad et al. with the crosstalk monitoring scheme of Ho et al. because measuring crosstalk caused by SRS helps engineering transmission systems, e.g., determining distance between adjacent wavelengths. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use crosstalk monitoring scheme of Ho et al. for measuring

crosstalk caused by SRS, as taught by Seydnejad et al., because it helps engineering transmission systems.

Regarding claim 3, Ho et al. teaches in FIG. 3 to control the output characteristics of the multiplexed optical signal by weight adjustment.

Regarding claims 39-40, Seydnejad et al. teaches SRS.

Regarding claim 42, Official Notice is taken that it is well known in the art that a photodiode converts optical signal into photocurrent which is converted into voltage by trans-impedance amplifier. As indicated by Ho in equation (4), the photocurrent presents channel power.

Regarding claim 44, Ho et al. teaches in FIG. 1 multiplexer and demultiplexer which are optical devices.

Claims 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al. and Seydnejad et al. as applied to claims 1-3, 15, 39-40, 42 and 44 above, and further in view of Fatehi et al. (U.S. Patent 5,892,606).

Ho et al. and Seydnejad et al. have been discussed above in regard to claims 1-3, 15, 39-40, 42 and 44. Regarding claims 41, Seydnejad et al. teaches in first paragraph, Introduction, that dithers are also used for channel identification. The difference between Ho et al. and Seydnejad et al. is that Ho et al. and Seydnejad et al. do not teach using a plurality of dithers for each wavelength channel. Fatehi et al. teaches in FIG. 3 to use a plurality of tones for tagging a wavelength channel. One of ordinary skill in the art would have been motivated to combine the teaching of Fatehi et al. with the modified crosstalk monitoring scheme of Ho et al. and

Seydnejad et al. because using a plurality of tones reduces the number of different tones needed for tagging a given number of wavelengths and reduces cost. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of tones for tagging each wavelength channel, as taught by Fatehi et al., in the modified crosstalk monitoring scheme of Ho et al. and Seydnejad et al. because using a plurality of tones reduces the number of different tones needed for tagging a given number of wavelengths and reduces cost.

(10) Response to Argument

The Appellant argues on page 8 of the Brief that in the claims of the present application there is no indication that the multiplexed optical signal is demultiplexed prior to the steps of "determining channel power of at least one channel of the plurality of channels." The Appellant submits that an example of how the power and the dither of at least one channel of the multiplexed optical signal can be monitored is described on page 7, line 27 to page 8, line 3 of the present application, where the application states an OSA (optical spectrum analyzer) is used "to measure an indication of channel power of at least one channel of the plurality channel".

First, examiners are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim should not be read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003). Claim 1 recites "A method of monitoring cross-talk, at a point in an optical system, arising at least in part from a non-linear process in a transmission medium utilized in the optical system, in a multiplexed optical signal having a plurality of channels upon one or more of which has been impressed, at another point in the optical system, a unique dither,

the method comprising:". Since the claim uses the inclusive or open-ended transitional phrase "comprising", it does not exclude a demultiplexing step before the step of "determining channel power of at least one channel of the plurality channels."

Second, cross-talk is the general term given to the effect of other signals on the desired signal (see Ramaswami, "Optical Networks: a Practical Perspective", Academic Press, 1998, page 217). There are inter-channel crosstalk and intra-channel crosstalk. The present invention and the Ho et al. reference mainly deal with inter-channel crosstalk. It is understood that if the channels are transmitted separately, there would be no, or minimal, inter-channel cross-talk. Inter-channel cross-talk only arises if several wavelength channels are multiplexed together as a wavelength division multiplexed (WDM) signal. This is the case of the transmission system of FIG. 1 of Ho et al. and instant application. In FIG. 1 of Ho et al., N channels are multiplexed together by the multiplexer before the oval symbol labeled "optical link or network". The claim language simply states the fact that the plurality channels are transmitted as a multiplexed optical signal. The claim should not be interpreted as implying "determining channel power of at least one channel of the plurality of channels without demultiplexing the WDM signal".

Third, claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their broadest reasonable interpretation'." 710 F.2d at 802, 218 USPQ at 292 (quoting In re Okuzawa, 537 F.2d 545, 548, 190 USPQ 464, 466 (CCPA 1976)). The interpretation suggested by the Appellant is not supported by instant specification. Instant specification teaches in FIG. 4A and FIG. 4B examples of an OSA. Instant specification teaches on page 26, lines 3-4,

"*The OSA 230 comprises a **demultiplexer** (DeMUX) 250 and an electrical switch 260 ...*" (emphasis added)

and on the same page, lines 21-22,

"*The multiplexed optical signal OSA3 propagates to the DeMUX 250 where it is **demultiplexed***." (emphasis added)

Similarly, in FIG. 4B, the multiplexed optical signal is passed into a demultiplexer 250 for demultiplexing the multiplexed optical signal into individual channels 270. That is, instant specification teaches that the multiplexed optical signal is demultiplexed prior to the steps of determining channel power of at least one channel of the plurality of channels. Furthermore,. nowhere does instant specification teach determining channel power of at least one channel of the multiplexed optical signal without demultiplexing the multiplexed optical signal.

The Appellant argues on page 8 of the Brief that Ho discloses monitoring linear cross-talk arising from demultiplexing of a signal after it has been demultiplexed by the grating-based demultiplexer, which is different than what is recited in the claimed of the present application. The Examiner disagrees. As illustrated in FIG. 1 of Ho et al., the dither tones are added at the transmitters to each wavelength channels. The channels are then multiplexed and passed through the optical link (transmission medium) and demultiplexed at the receiver side. The cross-talk monitoring system of Ho et al. monitors cross-talk regardless of whether it arises from the demultiplexer or is caused by the non-linear effects of the transmission medium. It may be true that Ho et al. does not appreciate that the cross-talk measured arises in part from the non-linear effects of the transmission medium. However, non-linear effects of transmission medium are inherent properties and non-linear effects causing cross-talk is a natural phenomenon. The

discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discover. Atlas Power Co. v. Ireco Inc., 190 F.3d 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Furthermore, Seydnejad et al. teaches that cross-talk can also arise due to SRS effect of transmission medium. The teaching of Seydnejad et al. enables one of ordinary skill in the art to appreciate that the measured cross-talk is partly due to SRS effect of transmission medium.

The Appellant argues on page 9 of the Brief that "there would be little chance of success in arriving at the claimed invention in combining Ho and Seydnejad because Ho demultiplexes the optical signal and Seydnejad does not specifically disclose if channel powers and dithers are determined from the channels of a multiplexed optical signal or demultiplexed signals of a formerly multiplexed signal. Without disclosing all the features of claim 1, it is not reasonable to expect the combination of references would be successful in arriving at the claimed invention, especially in view of the fact that the Examiner has not provided an explanation of how the missing feature would be obvious." The Examiner disagrees.

First, as discussed above, the combination of Ho and Seydnejad teaches all the limitations of claim 1. Second, the rejection does not suggest a modification of the structure of the monitoring scheme of FIG.1 of Ho et al. Instead, the rejection is based on the recognition that when monitoring cross-talk using the system of FIG. 1 of Ho et al., the measured cross-talk is contributed in part from the SRS of the transmission medium, as taught by Seydnejad et al. Since the photodiodes, the amplifiers and the tone power monitor of FIG. 1 of Ho et al. do not differentiate between cross-talk arising from SRS and cross-talk arising from the demultiplexer, the monitor system of FIG. 1 would measure the total cross-talk arising from both SRS and

demultiplexer. Therefore, there is undoubtedly reasonable expectation for the combination of Ho et al. and Seydnejad et al. to succeed.

The Appellant argues on pages 9-10 of the Brief that the Examiner has not established a motivation to combine the references from any of the three sources. The Examiner disagrees. In response to appellant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Seydnejad et al. teaches that SRS of transmission medium also causes cross-talk. As discussed above, the monitoring system of FIG. 1 of Ho et al. monitors the cross-talk regardless of the cause of the cross-talk. However, a craftsperson might want to understand the cause of cross-talk so that they can properly engineering an optical transmission system. For example, a craftsperson might use the monitor system of Ho et al. to evaluate cross-talk for different transmission media and choose the one that gives lowest cross-talk.

The Appellant argues on page 11 that using Ho to monitor non-linear cross-talk in a multiplexed optical signal would change the principle of the operation of system described in Ho. The Examiner disagrees. Ho et al. teaches all the steps of claim 1. The only difference between Ho et al. and the claimed invention is the recognition of the fact that the same method can be used for measuring cross-talk arising in part from a non-linear process in a transmission medium.

If a prior art structure (or manipulation) is capable of performing the intended use as recited in the preamble, then it meets the claim. See, e.g., In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). Since the steps of the method as recited in claim 1, or the components of the apparatus as recited in claim 15, do not differentiate whether the power, fractional power and power transfer coefficient are affected by, or arise from, linear or non-linear effects, the structure and manipulation of Ho et al., combined together with the teaching of Seydnejad et al., is capable of monitoring linear crosstalk as well as nonlinear non-linear crosstalk and meets the claim. The use of Ho et al. for monitoring crosstalk including non-linear crosstalk may change the ***intended use*** of the system. However, it does not change the ***principle of operation*** of the system because the operation of the claimed method/apparatus and the operation of the system of Ho et al. do not differentiate the causes of the crosstalk.

The Appellant argues on page 13 of the Brief that there is a lack of motivation to combine the references of Ho and Seydnejad with Fatehi. In response to appellant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, using a plurality of tones reduces the number of different tones needed for tagging a given number of wavelengths and reduces cost. For example, using a single tone for tagging wavelength channels N tones can tag N wavelength channels. If one uses a combination of two different tones for tagging each wavelength

channels, N tones can tag wavelength channels. For example, using five different tones, one can tag ten wavelength channels; using ten different tones, one can tag 45 wavelength channels. This greatly reduces the number of tone generators required.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

skl

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Appendix to the Examiner's Answer

Claim 44 as listed in the amendment dated 13 March 2006.

44. (Previously presented) An apparatus according to claim 15 comprising a plurality of basic functional components which are optical devices.